

## James Webb Space Telescope (JWST)

Eric P. Smith  
Program Status and Replan  
September 2011



# Telescope Size Comparison



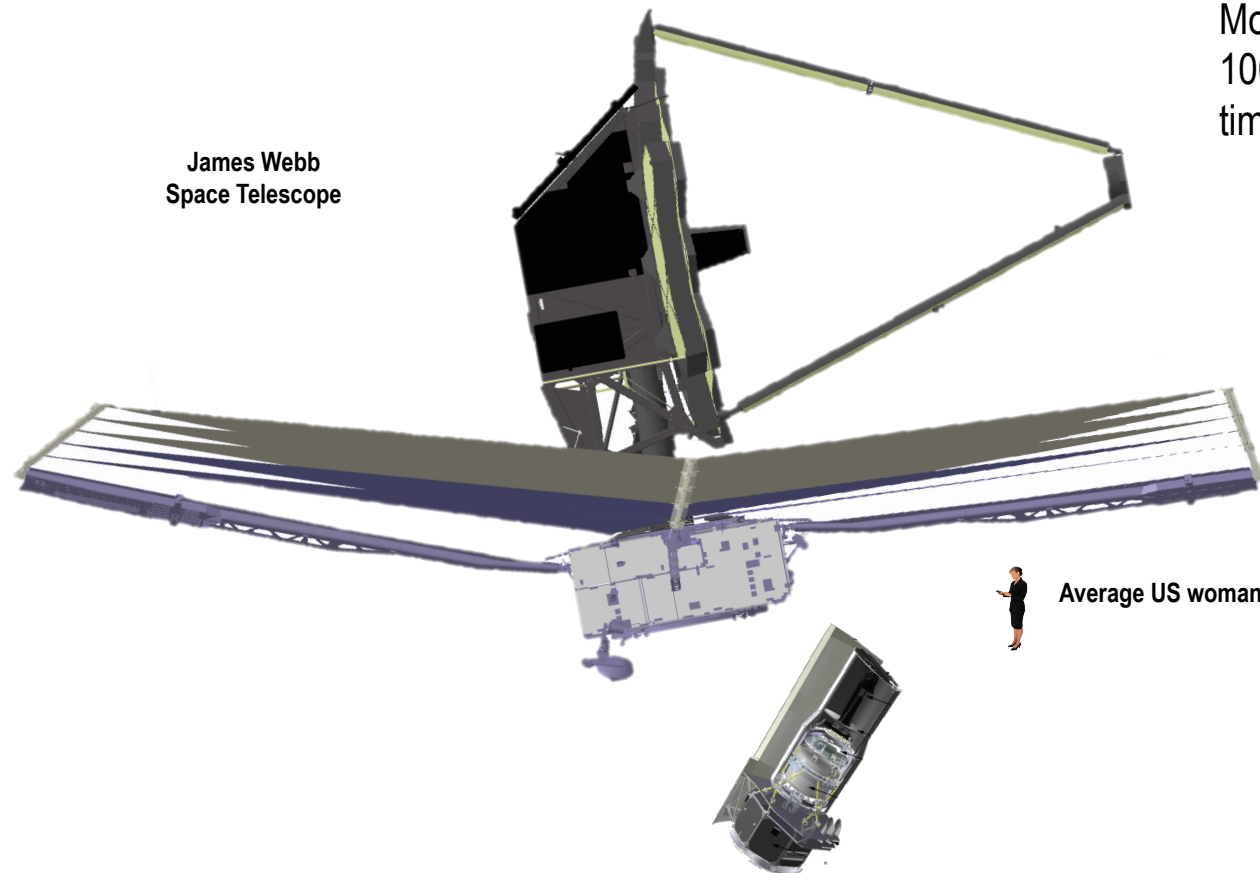
## JWST is the scientific and technological successor to HST and *Spitzer*

HST has looked deeper into the Universe than any telescope. It took HST more than three continuous days to do so. JWST will do that in less than an hour

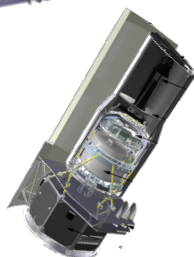
### JWST is:

More than 6 times the collecting area of HST,  
100 times more sensitive than HST, over 1000  
times more than *Spitzer*, and half the mass of HST

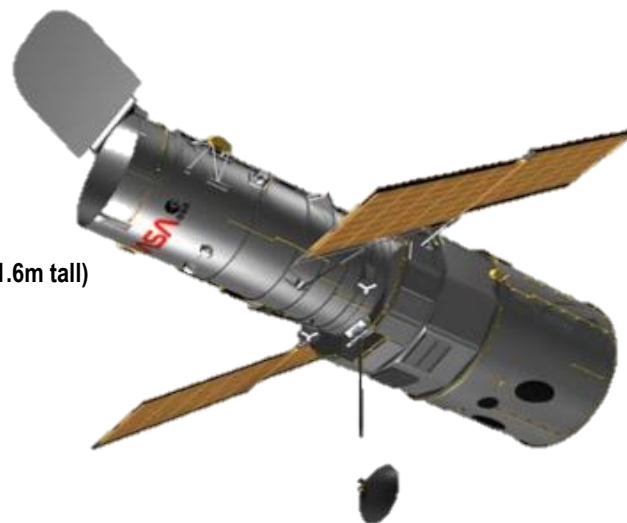
James Webb  
Space Telescope



Spitzer Space Telescope



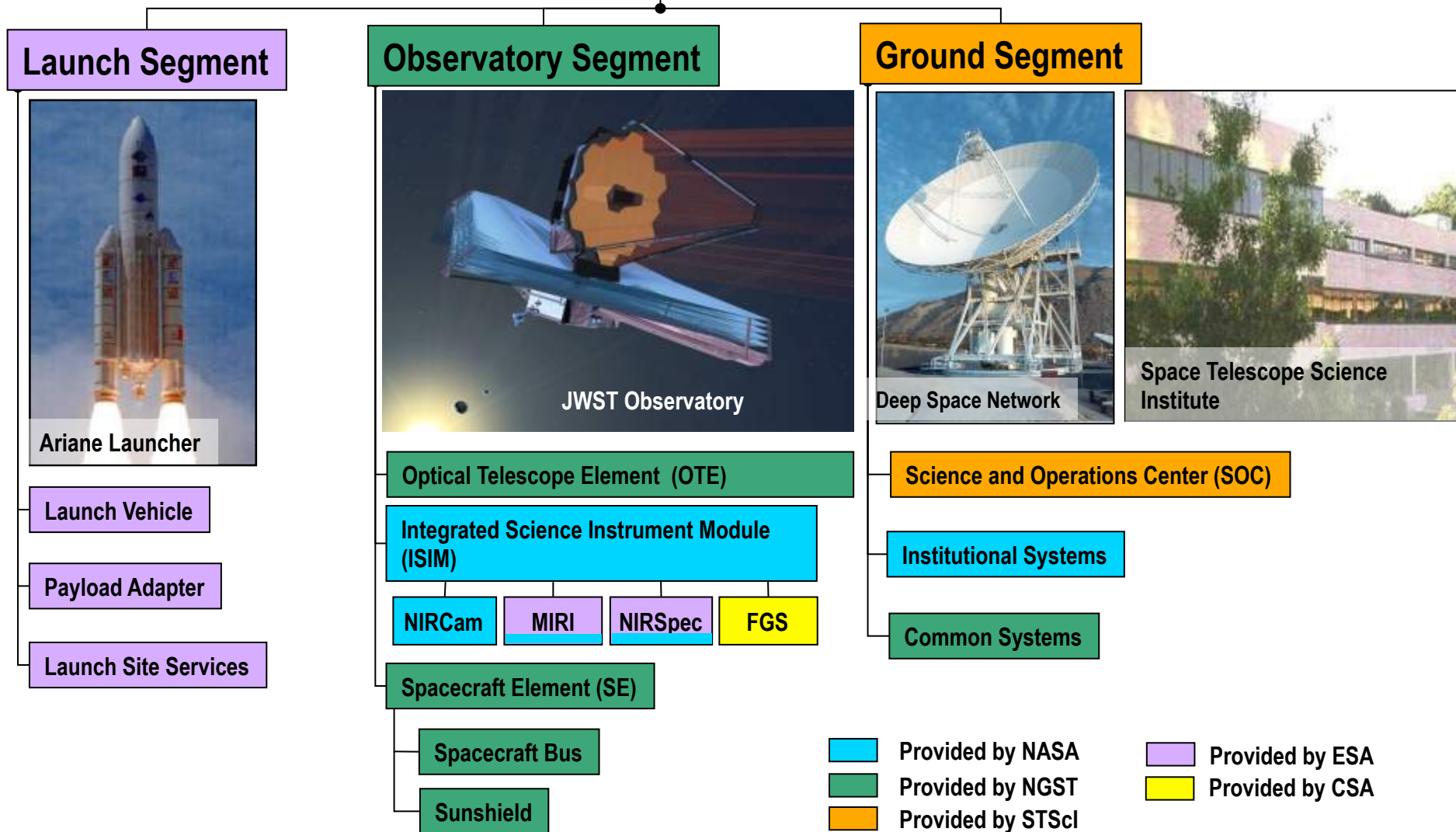
Average US woman (1.6m tall)



Hubble Space Telescope

# JWST System Hierarchy

## James Webb Space Telescope System





# Summary of NASA's Response to the Independent Comprehensive Review Panel (ICRP) Report



- **ICRP confirmed that there are no technical issues on JWST**
  - Have made significant progress since start, matured enabling technologies and reduced technical risk
- **NASA agrees with all recommendations from the ICRP**
  - Elevated Program visibility, reporting, performance assessment and cost control at GSFC, HQ, NGAS and subcontractors
  - All JWST senior management at GSFC and HQ have been replaced
  - At GSFC, JWST reports to Center Director
  - At HQ, JWST has been elevated to a division level in SMD (like Mars and HST in the past) and reports weekly to the NASA Associate Administrator
  - Used ICRP cost and schedule estimate as one of the inputs used to develop new baseline
  - NASA's Response to the ICRP Report is available on line:

[http://www.jwst.nasa.gov/resources/  
JamesWebbSpaceTelescopeIndependentComprehensiveReviewPanelReport.pdf](http://www.jwst.nasa.gov/resources/JamesWebbSpaceTelescopeIndependentComprehensiveReviewPanelReport.pdf)

- NASA submitted a report to Congress on April 21, 2011 including the ICRP Report and NASA's detailed response to the ICRP recommendations pursuant to Section 103(d)(1) of P.L. 109-155





# JWST Replan



- **Replan developed by government and contractor team**
- **Replan supports an October 2018 launch date**
- **Replan included a Joint Cost and Schedule Confidence Level (JCL) analysis**
  - **Replan consistent with 80% confidence level**
- **Replan and JCL results have been reviewed by NASA's independent external review board – the JWST Standing Review Board (SRB)**
- **Replan has been presented to Agency management (both at GSFC and Headquarters)**
- **Replan factored in SRB findings and recommendations**



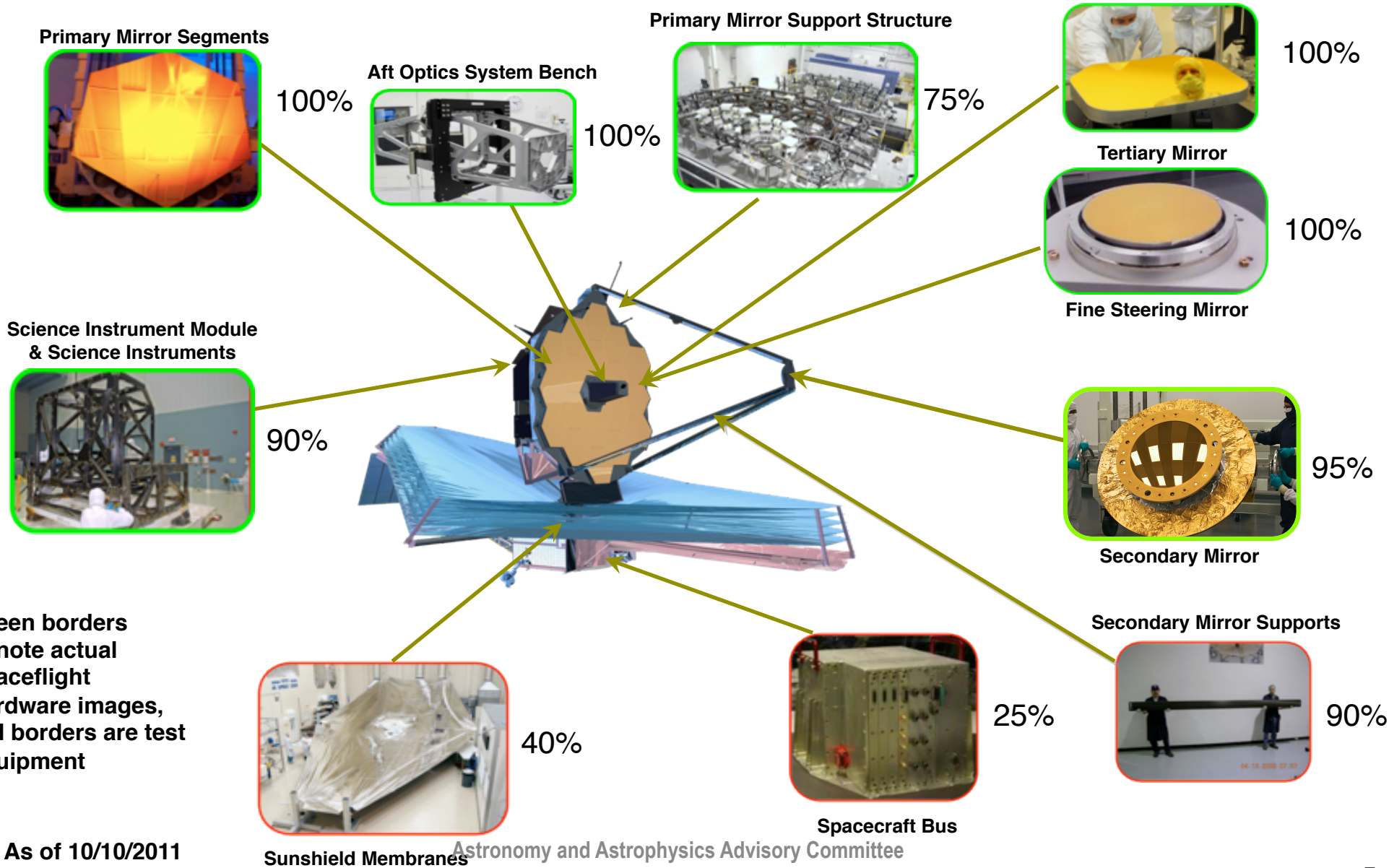
# JWST on a new path

- **NASA has made significant changes in the management of JWST**
- **Communications have greatly improved between HQ, Centers and contractors, especially at senior management levels**
  - Open and honest dialogue, quick identification of issues and agreement on fixes
- **Assessment of alternatives completed**
- **Adopted a replan with an October 2018 launch date**
  - Plan has adequate cost and schedule reserves consistent with an 80% confidence level
  - Replan is on track to support the FY13 budget process

**JWST made great progress in FY2011, achieving milestones within cost and schedule**

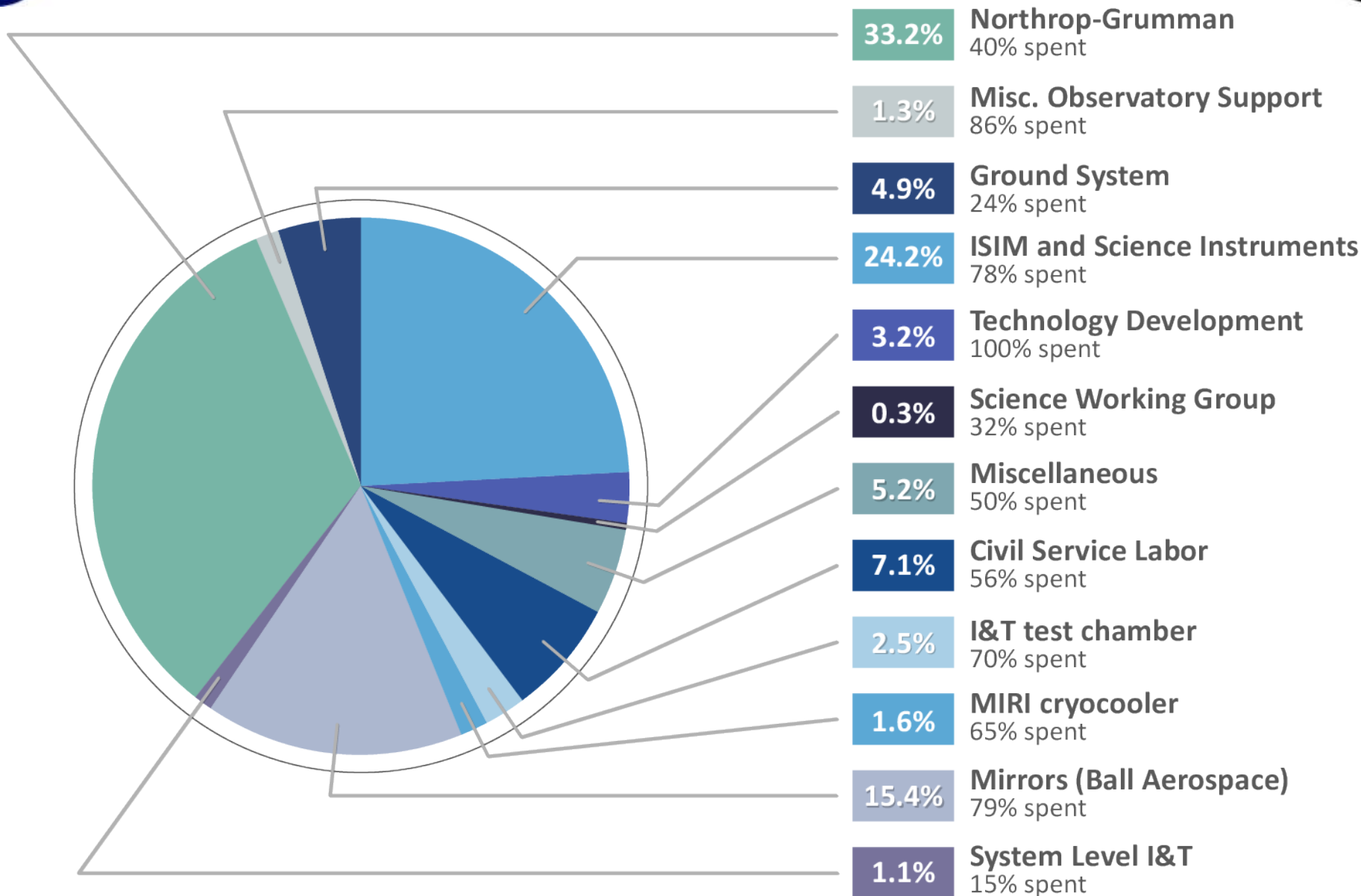


# Hardware Fabrication Completion Percentages





# Cost Breakdown by Element through FY11 (\$3.5B total)



Astronomy and Astrophysics Advisory Committee





# Family Portrait



## Secondary



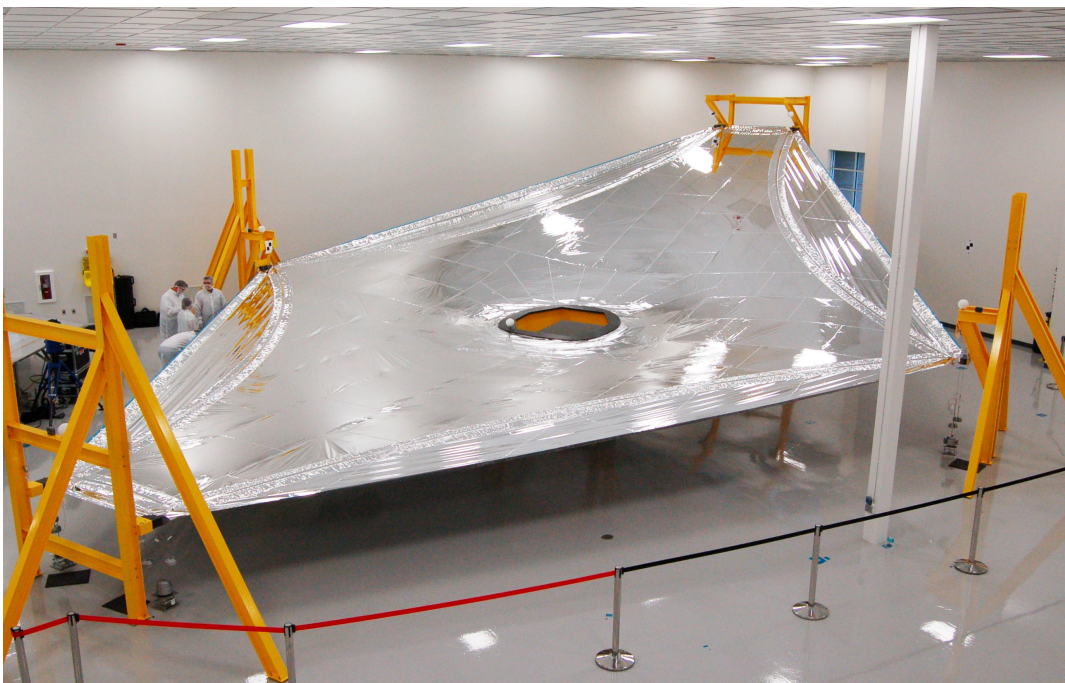
## Tertiary



## Fine Steering

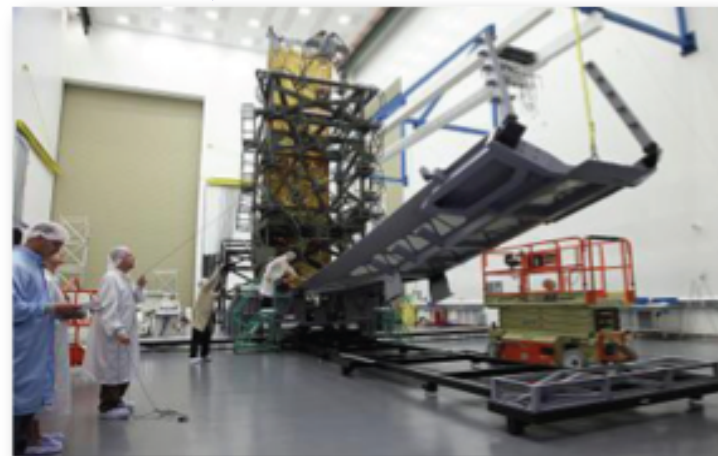
✓ Mirror segment has completed all thermal testing

- **Template membrane build to flight-like requirements for verification of:**
  - Shape under tension to verify gradients and light line locations
  - Hole punching & hole alignment for membrane restraint devices (MRD)



← **Layer-3 template membrane under tension for 3-D shape measurements at Mantech**

**Full-scale JWST mockup with sunshield pallette**







# Integration and Testing at GSFC

## Building 29 Clean Room



**Flight Integrated Science Instrument Module (ISIM)**



**Ambient Optical Assembly Stand  
Under construction**



# NASA's Proposed Offsets to support JWST 2018 Replan



**Total additional funds required FY2012-2016: \$1223 M**

- **FY2012 additional requirement: \$156M**
  - 50% from the Science Mission Directorate (SMD)
    - No funds from Earth Science
  - 50% from Agency's institutional support budget
- **FY2013-2016 additional requirement: \$1067M**
  - Details still being assessed





# JWST Near Term Program/Project Office Efforts



- **Provide Report to Congress under Sec 103(d)(2) of PL 109-155 (“Breach Report”)**
  - Projected cost and schedule for completing the program
  - Assessment of broad range of alternatives to the program
- **Develop Fiscal Year 2012 high-level milestones for external reporting**
- **Capitalize on new plan as we transition from re-planning to building**
  - Already have accelerated final tests of 6 remaining Primary Mirror Segment Arrays at the XRCF. Will start 10/24 and complete before year end.
  - Letter sent to Northrop-Grumman instructing them to pull in schedule on Primary Mirror Backplane Assembly by ~6-8 months.
  - Discussions underway to accelerate spacecraft Critical Design Review [CDR] (last remaining major element not past it’s CDR) by 4-6 months.